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Overview

by Vincent T. Devita, Jr.*

It is an honor to be here on the occasion of the 40th Anniversary of the Institute of Environmental Medicine of the New York University Medical Center. The Institute has been fortunate in its two Directors, Dr. Norton Nelson and Dr. Arthur Upton. They should, individually and together, take pride in the quality, strength, and vitality of the Institute.

The history of the Institute for Environmental Medicine and that of the National Cancer Institute are closely connected. Dr. Arthur C. Upton, the Institute's director since 1980, preceded me as director of the National Cancer Institute (NCI). Our personal linkage goes back even further. I read an interview with Dr. Nelson in the *NYU Physician*. He was describing his "intense, but polite" interview with Homer Smith, a man he admired immensely. I, too, was influenced by Homer Smith during one summer at the Mount Desert Island Biological Laboratory where I worked with C. Adrian Hogben. It was there I met Dr. David Rall, who eventually brought me to NCI and taught me all I know of pharmacology. I stayed at NCI, and David Rall left to head the new Institute of Environmental Health Sciences (NIEHS). It was there, also, that I met Dr. Upton during his tenure as NCI Director, and it was Dr. Upton who taught me all I know about statesmanship, but as those of you who know both of us are aware, not all he knows about statesmanship. In a further bond, Dr. Rall and I are now proud that NCI and NIEHS both support special centers at the Institute of Environmental Medicine.

This year has been one of celebration and review. In addition to the marking of 40 years by the Institute of Environmental Medicine, the National Institutes of Health is 100 years old, the National Cancer Institute is 50 years old, and the National Cancer Act is 15 years old. This reflective time is intensified by the fact that the Congress will begin hearings on the reauthorization of the National Cancer Act in the Spring. The key question often posed to me has been, What has been the value of the Act?

In my view, the National Cancer Act has given us a mandate to think of a world without cancer. It has also challenged us to think of the National Cancer Institute as a means to an end, not as an end in itself—a healthy view of institutions that could stand wider adoption. These two mandates, when expressed out loud, in public, often give rise to some concern about thinking that far ahead, but in my view, the pace of current biological discoveries actually demands that we do just that. Scientifically, it was a mandate to undertake what could be called "risky research," that is, to work for bigger payoffs in the long run—in short, to brighten the future. Risky projects such as work on cancer viruses and the start of the search for the human cancer viruses gave us the surprise of viral oncogenes; and then their cellular progenitors, the protooncogenes; and now, the anti-oncogenes, which promise possible therapies that can halt cell division itself. Also, because of the cancer virus program, NCI scientists were actively involved in research on the retroviruses when AIDS came along. This gave us a leg up on the discovery of the AIDS virus [human immunodeficiency virus (HIV)], as well as advancing work on treatment of AIDS and eventually a vaccine.

Currently we are supporting a number of prospective prevention studies, considered scientifically risky by some, but based on our massive support for basic research in cancer causation. Studies are testing whether or not intervening with modifications of diets, micronutrients, or chemotherapeutic agents will help prevent, halt, or reverse cancer progression in animals, or reduce the incidence or risk of cancer in humans exposed to carcinogens. With the development of transgenic mice, we have an ideal model for the examination of prospective prevention at the laboratory level as well.

I am also often asked what the major scientific accomplishments of the Cancer Program have been. Without a doubt, this program has given us a knowledge of cancer biology undreamed of in 1971. We are extremely close to understanding the reasons that normal cells become malignant. It appears that the uncontrolled growth we know as cancer is a manifestation of normal genetically controlled processes for growth and development gone awry. Even the ultimately lethal process of metastasis appears to be an aberration of the normal migration function of embryonic cells, also under genetic control. The good news is that these discrete genetic events appear to be interruptible steps with our current level of technology.

We all knew much less about health and the environ-

*National Cancer Institute, Bethesda, MD 20892.

ment when Dr. Nelson came to the Institute in 1947. Dr. Nelson has related that, in the early days, he and Anthony Lanza planned that the Institute should "... convert the basic science into useful and effective means to reduce the likelihood of occupational disease... ." The likelihood of this farsighted wish coming true is brighter today than ever before due to the biological revolution.

The most recent observation that recessive genes, suppressor genes, or anti-oncogenes, as they are called by some, not the dominant oncogenes themselves, may be the essential elements in maintaining order in the complex arrangement of control of growth and development, and their deletion or reduction to homozygosity may identify those with a susceptibility to cancer is extraordinarily exciting. From the point of view of environmental carcinogenesis, the tools of molecular genetics, like these, now offer us the prospect of identifying persons who are at special risk from exposure to carcinogens and should allow us to focus our prevention efforts where they can do the most good. The nation is fortunate to have an Institute of Environmental Medicine ready and poised to take advantage of the opportunities presented by such new information.

Again, I want to congratulate the Institute, and at the same time, underline our common interests and emphasize our responsibility to support and stimulate each other. We can take pride in our common achievements and continue to work toward the goal we share, framed appropriately enough by Lewis Thomas in his book *The Medusa and the Snail*. This paragraph bears on a facet of the value of the National Cancer Act: the need for a mandate to take scientific risks, and to think boldly of a world without cancer:

> The brightest and most optimistic of my presentiments about the future of human health always seem to arouse a curious mixture of resentment and dismay among some very intelligent listeners. It is as though I'd said something bad about the future. Actually, all I claim, partly on faith and partly from spotty but unmistakable bits of evidence out of the past century of biomedical science, is that mankind will someday be able to think his way around the finite list of major diseases that now close off life prematurely or cause prolonged incapacitation and pain. In short, we will someday be a disease-free species (*1*).

REFERENCES

1. Thomas, L. More notes of a biology watcher. In: The Medusa and the Snail. Viking Press, New York, 1974, p. 130.